The Cassini Radio and Plasma Wave Investigation

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What Are Radio Waves?

- These are naturally-occurring radio emissions which are generated in a plasma and which propagate over some distance to the Cassini RPWS receivers.
- Planetary radio waves allow us to remotely sense various regions of the magnetosphere.

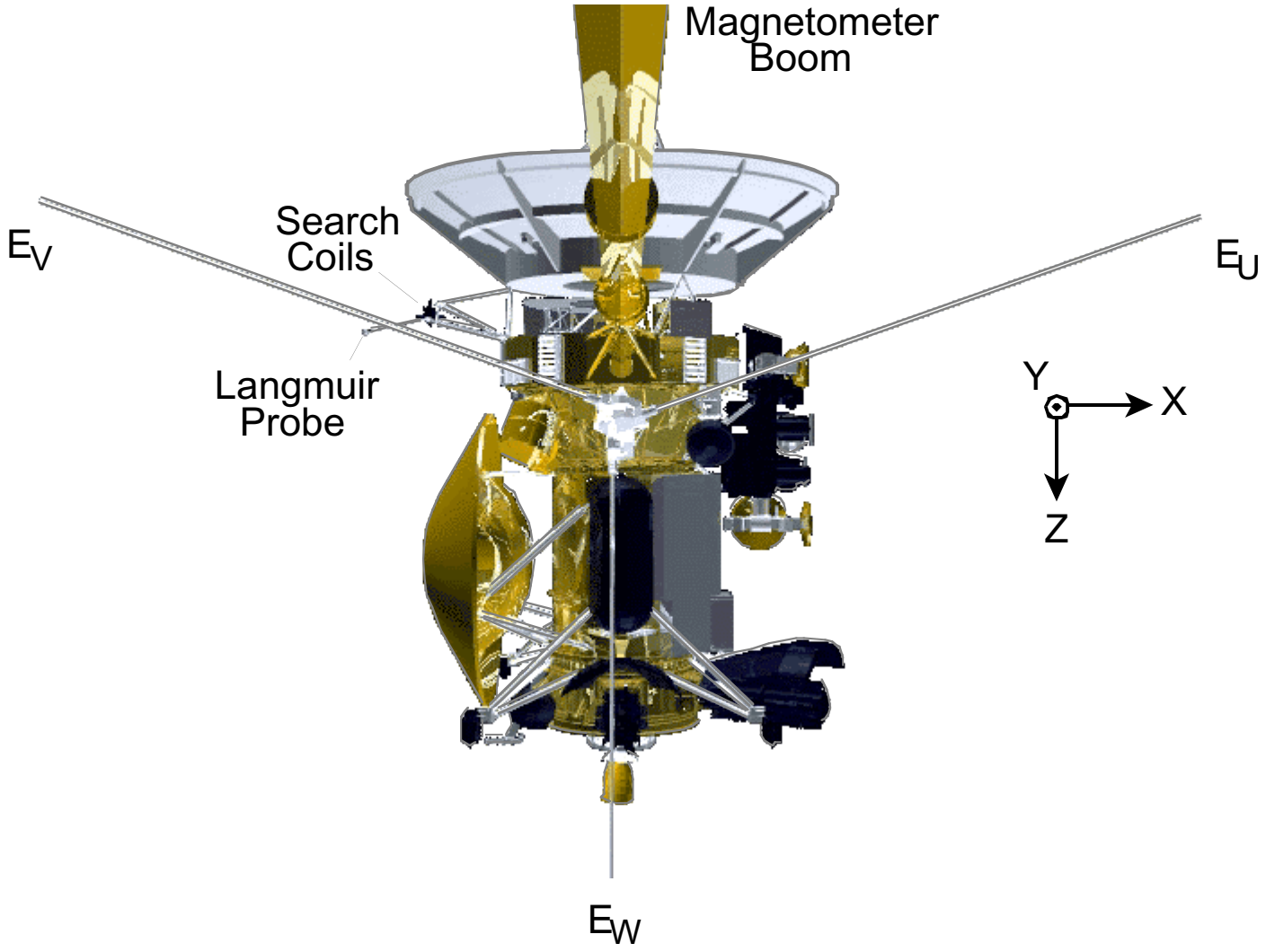
What Are Plasma Waves?

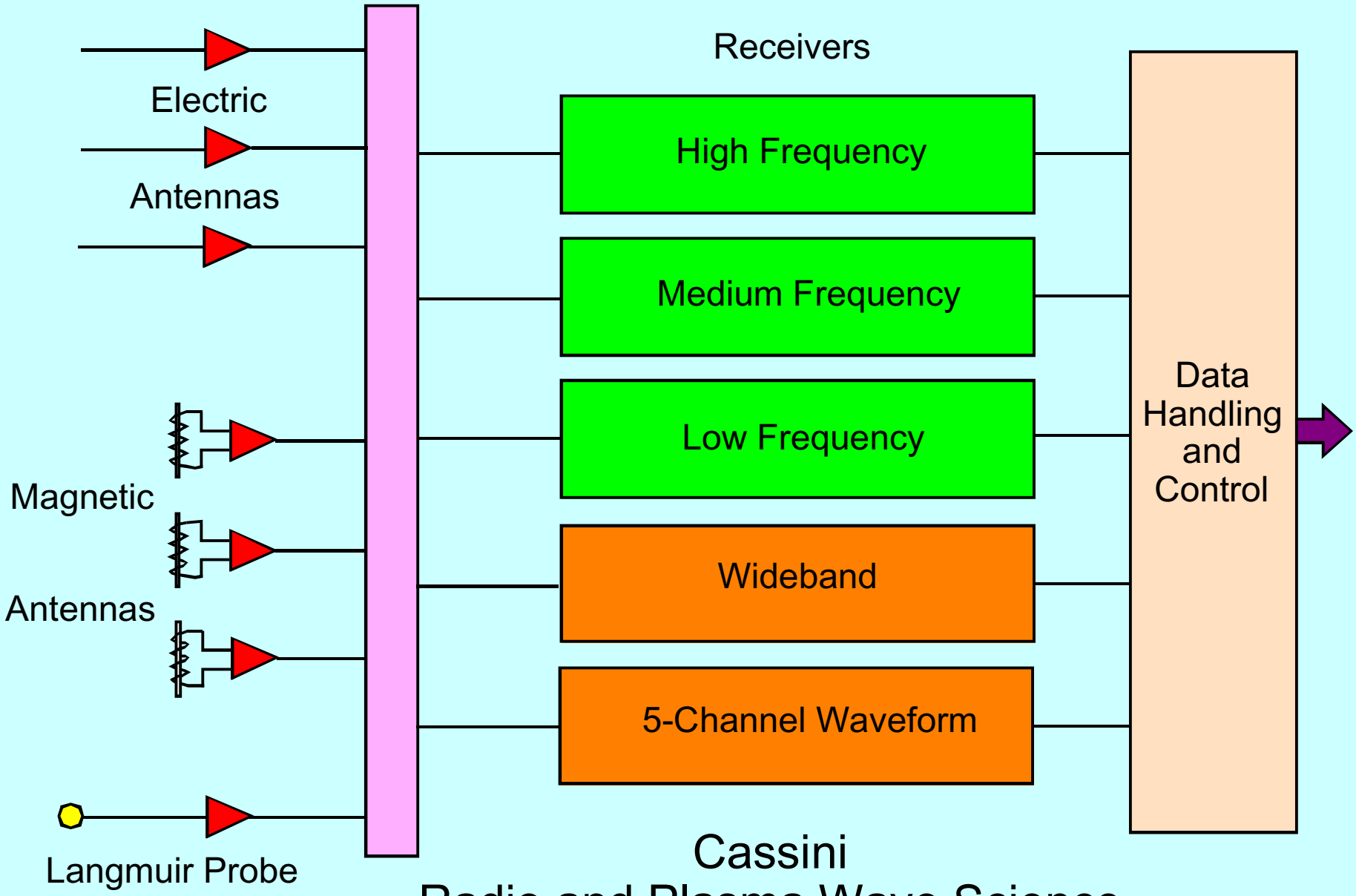
- These are electric and magnetic disturbances resulting from non-random motions of charged particles (electrons and ions).
- Plasma waves help us to understand how plasmas and magnetic fields work together in planetary magnetospheres and their interactions with the solar wind, satellites,and rings.

What is the RPWS?

- This is basically a radio which can be tuned to frequencies between 1 Hz and 16 MHz using 3 electric antennas and 3 magnetic antennas. It has a number of specialized receivers to analyze radio and plasma waves.
- The RPWS also has a Langmuir probe to measure the plasma density and temperature near Titan, the icy satellites, and the rings of Saturn.

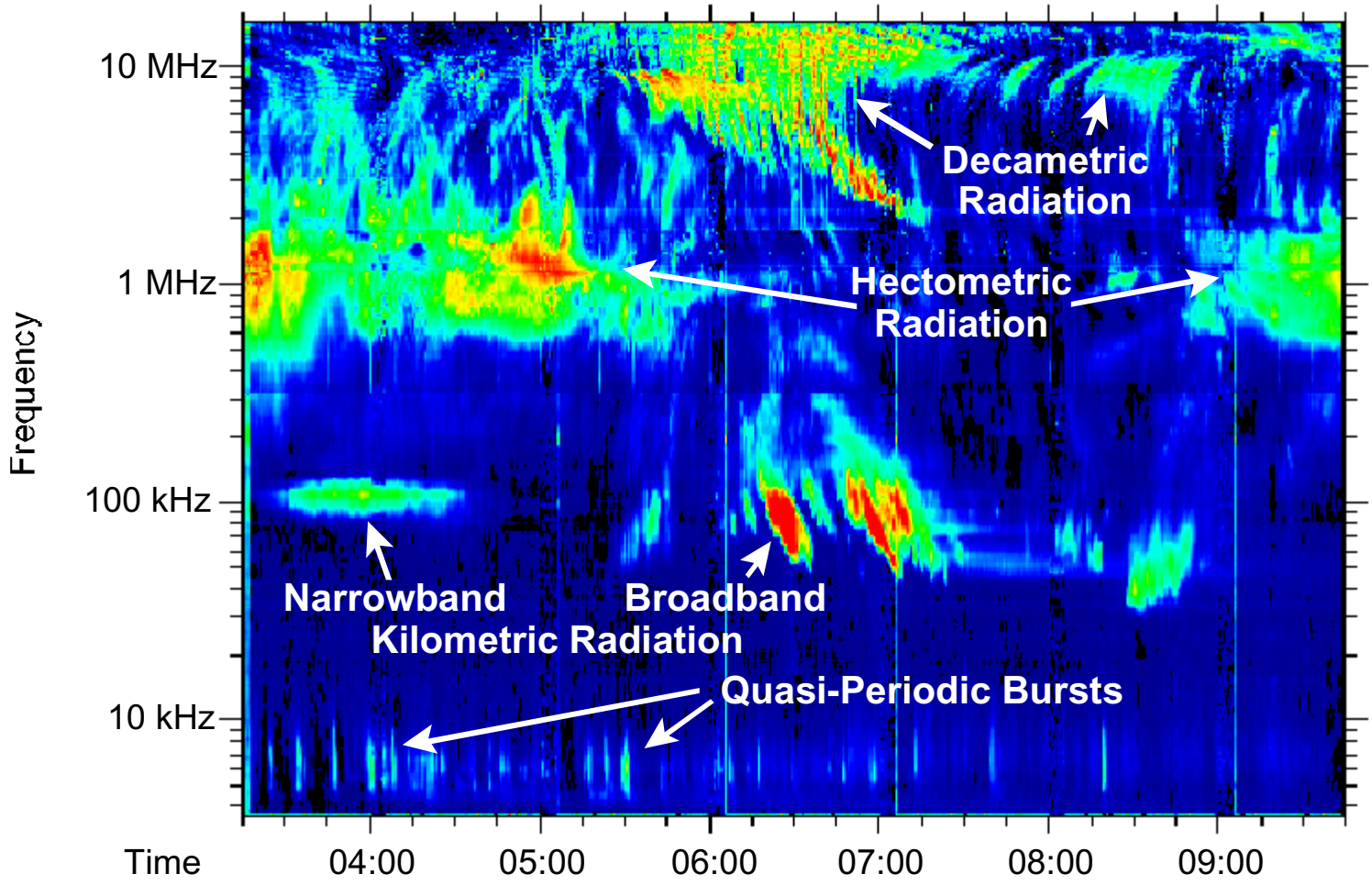
Cassini RPWS Sensors

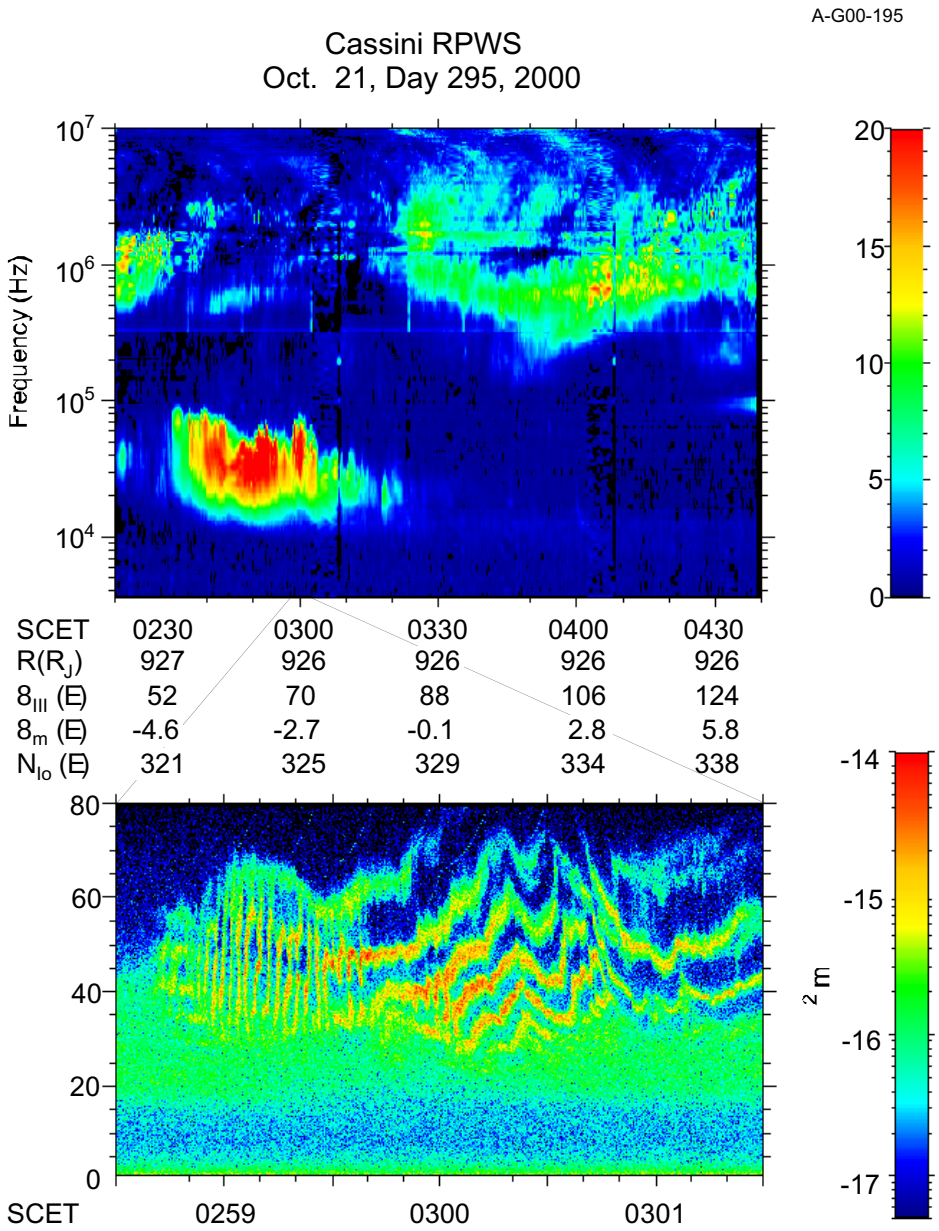




Cassini
Radio and Plasma Wave Science

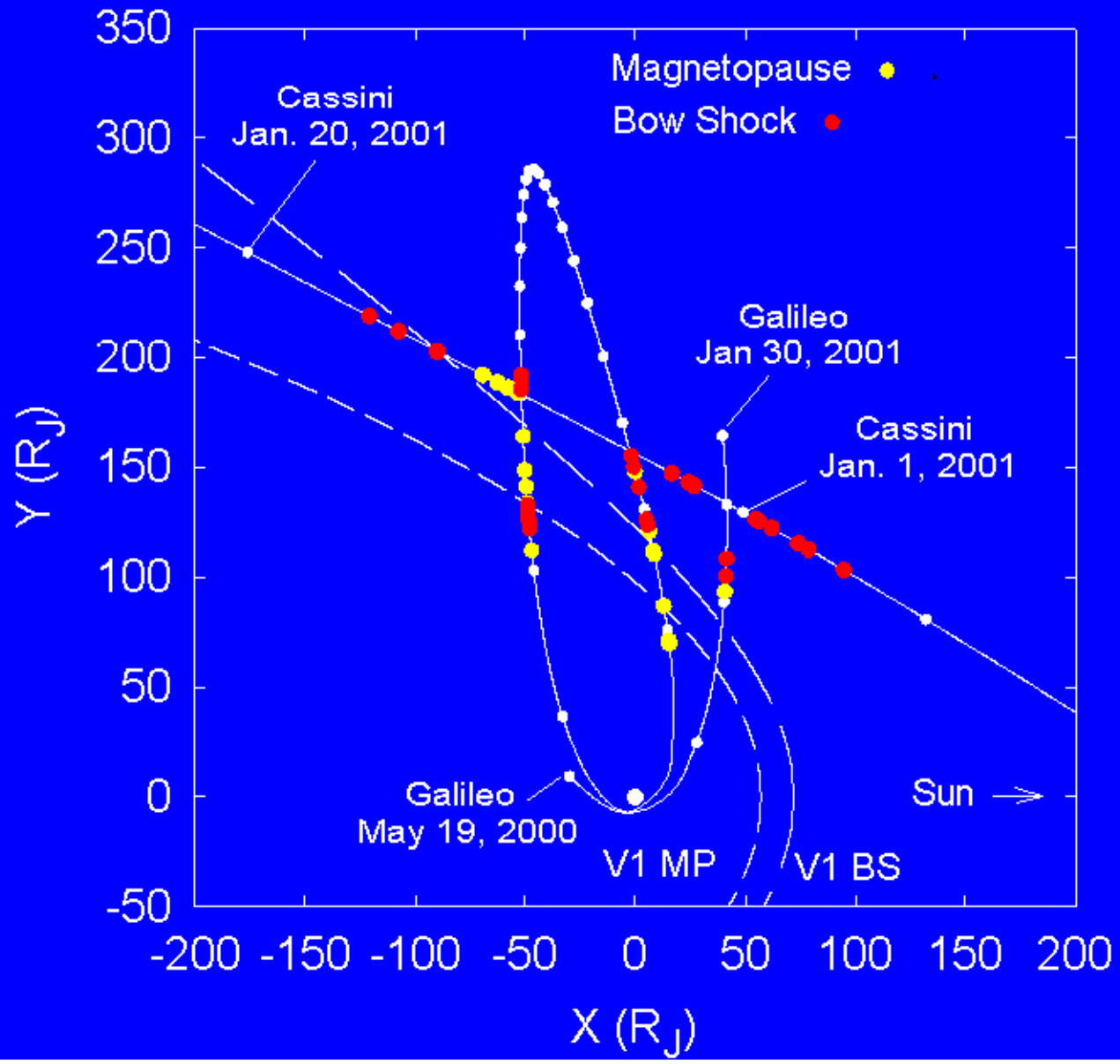
Cassini Radio and Plasma Wave Science
December 3, 2000



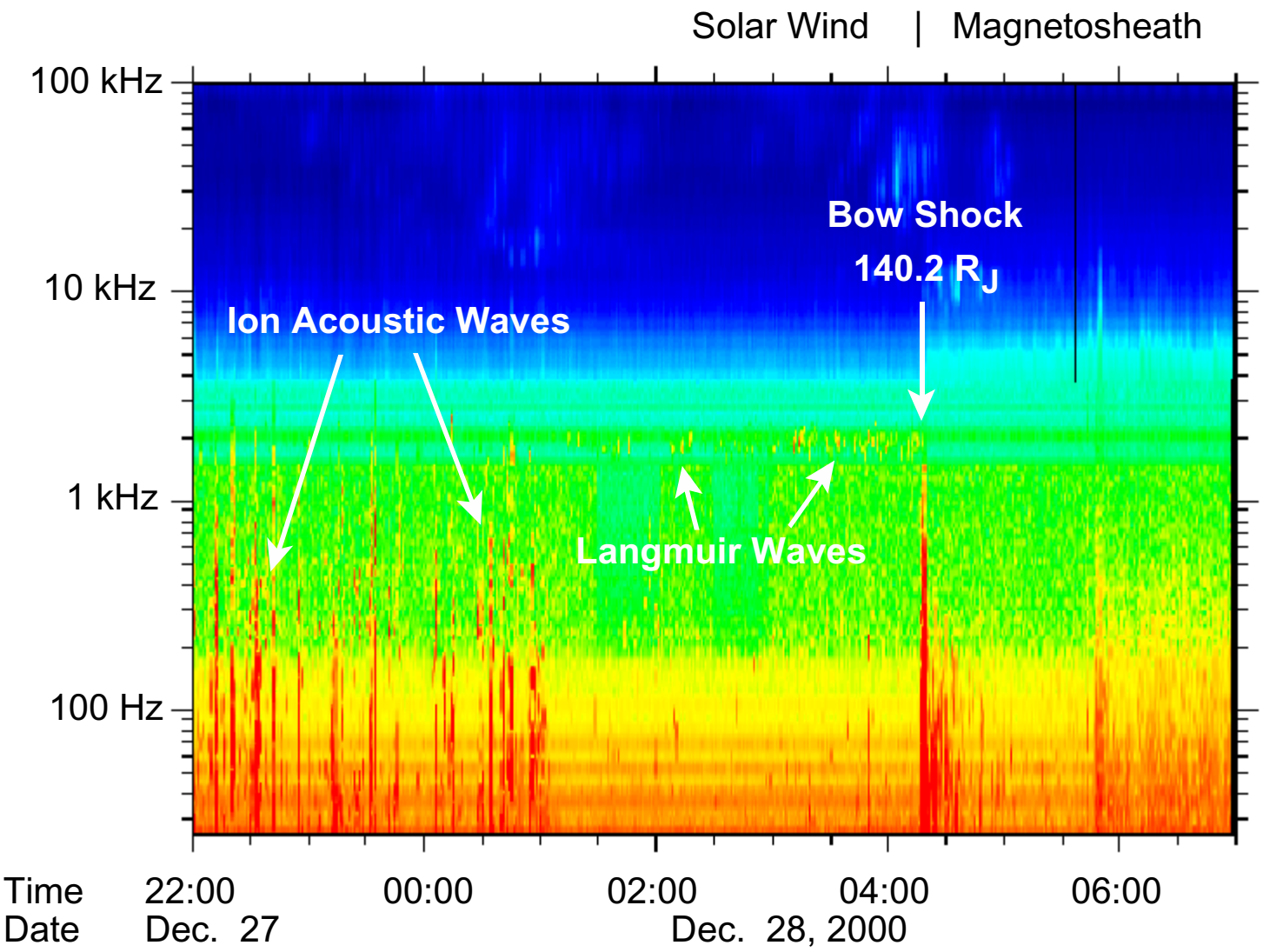

A-G00-195
Cassini RPWS
Oct. 21, Day 295, 2000
Frequency (Hz)
10^7
10^6
10^5
10^4
20
15
10
5
0
SCET 0230 0300 0330 0400 0430
R(R_J) 927 926 926 926 926
8_{III} (E) 52 70 88 106 124
8_m (E) -4.6 -2.7 -0.1 2.8 5.8
N_{Io} (E) 321 325 329 334 338
80
60
40
20
0
SCET 0259 0300 0301
-14
-15
-16
-17
^{2} m

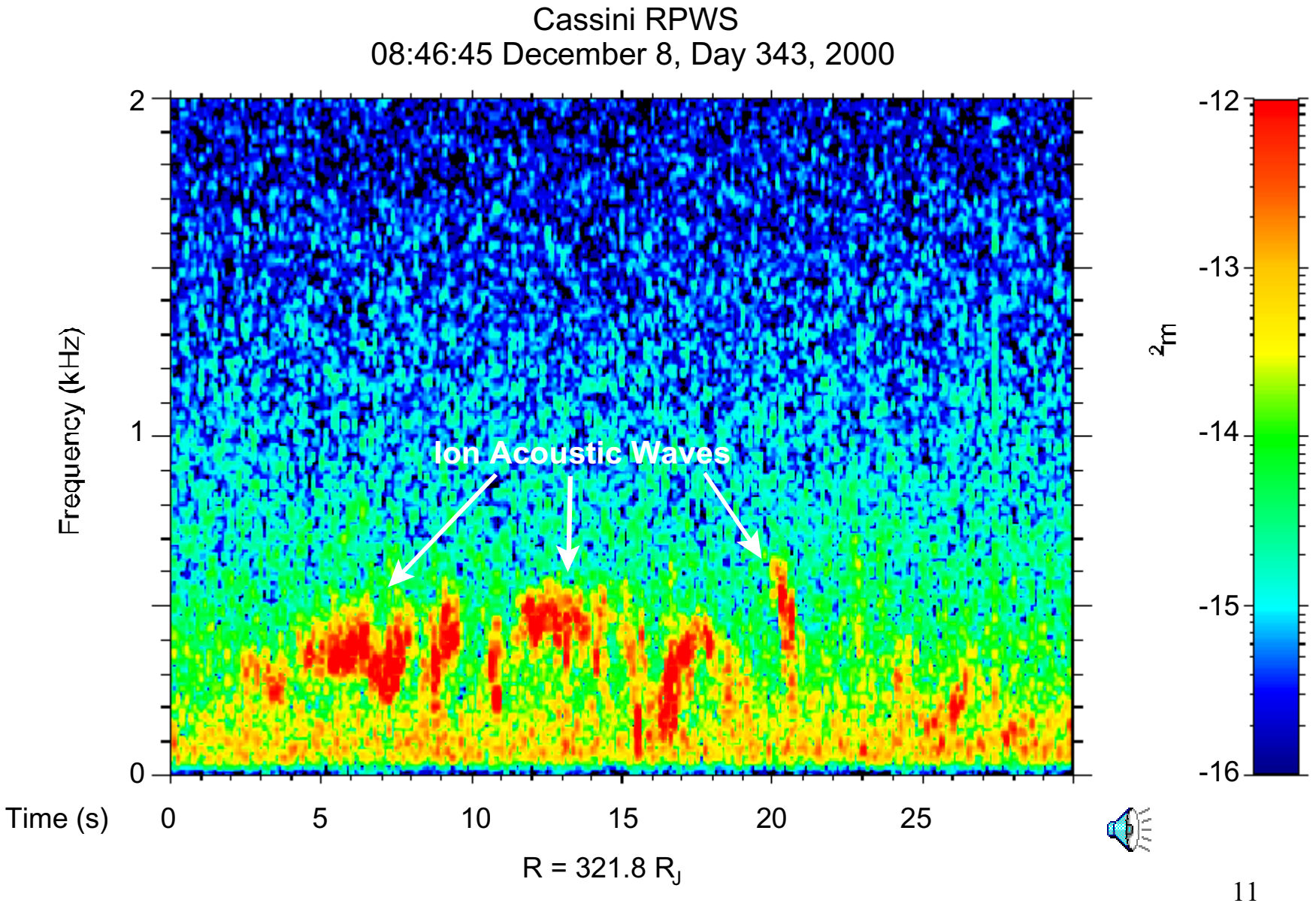
A-G01-16

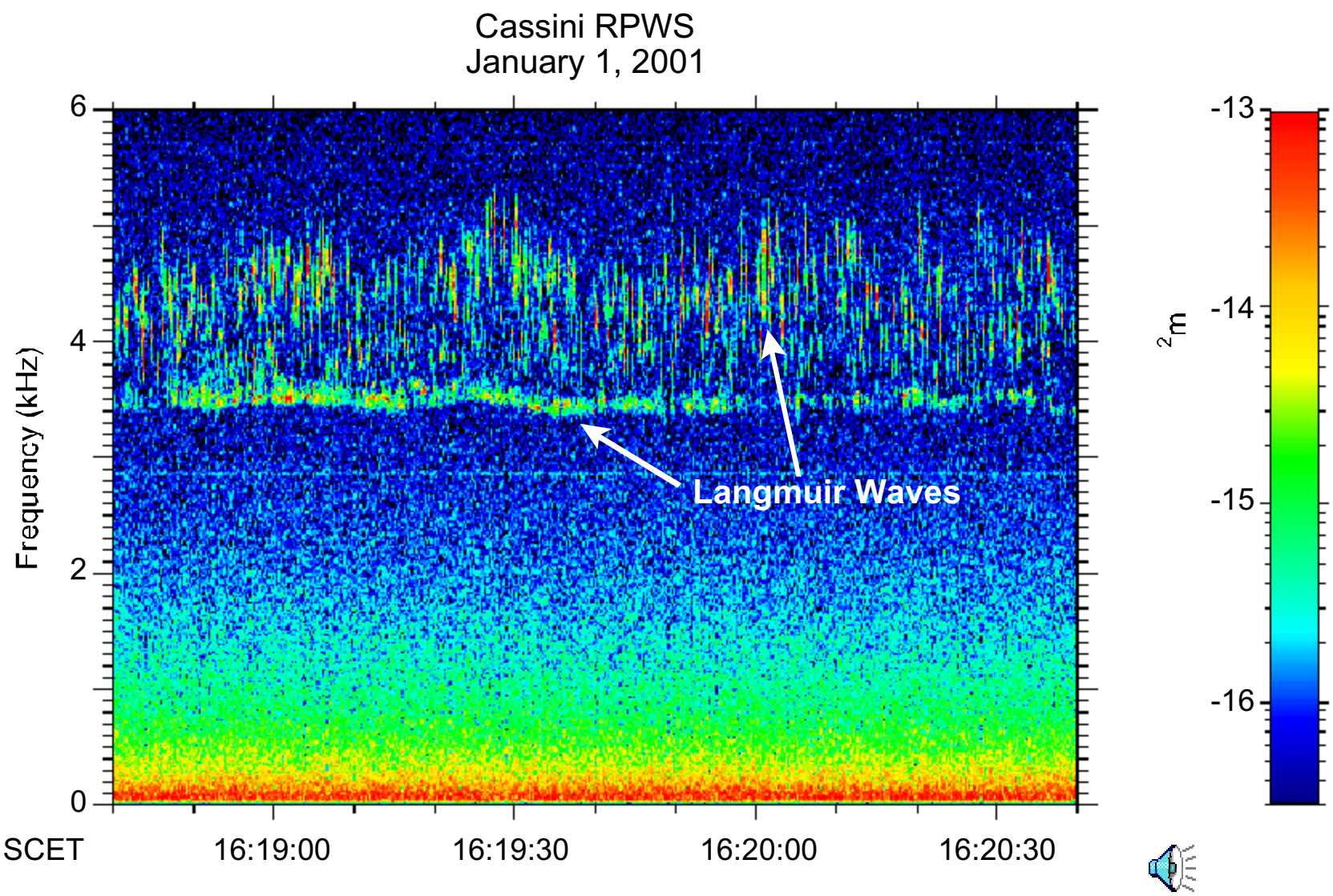
Cassini and Galileo Magnetopause and Bow Shock Crossings



Cassini Radio and Plasma Wave Science




Cassini RPWS
08:46:45 December 8, Day 343, 2000
Ion Acoustic Waves
Frequency (kHz)
2
1
0
Time (s)
0
5
10
15
20
25
R = 321.8 R_J
-12
-13
-14
-15
-16
²m


Cassini RPWS
January 1, 2001
Frequency (kHz)
6
4
2
0
SCET
16:19:00
16:19:30
16:20:00
16:20:30
Langmuir Waves
-13
-14
-15
-16
^{2}m
R = 140.3 R$_J$

Cassini RPWS
January 10, 2001